

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Srinath Hosur, *et al.*

Serial No.: 10/755,603

Filed: January 12, 2004

Title: TIME-SWITCHED PREAMBLE GENERATOR, METHOD OF
GENERATING AND MULTIPLE-INPUT, MULTIPLE-OUTPUT
COMMUNICATION SYSTEM EMPLOYING THE GENERATOR
AND METHOD

Grp./A.U.: 2618

Examiner: Dominic E. Rego

Confirmation No.: 9552

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ATTENTION: Board of Patent Appeals and Interferences

Sirs:

APPEAL BRIEF UNDER 37 C.F.R. §41.37

This is an appeal from a Final Rejection dated July 13, 2007, of Claims 1-24. The Appellants submit this Brief with the statutory fee of \$510.00 for a large entity as set forth in 37 C.F.R. §41.20(b)(2), and hereby authorize the Commissioner to charge any additional fees connected with this communication or credit any overpayment to Deposit Account No. 20-0668.

This Brief contains these items under the following headings, and in the order set forth below in accordance with 37 C.F.R. §41.37(c)(1):

- I. REAL PARTY IN INTEREST
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I. REAL PARTY IN INTEREST

The real party in interest in this appeal is the Assignee, Texas Instruments Incorporated.

II. RELATED APPEALS AND INTERFERENCES

No other appeals or interferences will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

Claims 1-24 are pending in this application and have been rejected under 35 U.S.C. §112 or 35 U.S.C. §103(a). Each of the pending claims are being appealed.

IV. STATUS OF THE AMENDMENTS

The present Application was filed on January 12, 2004, with Claims 1-24. In the first Examiner's Action mailed January 25, 2007, the Examiner rejected Claims 1-3, 7-11, and 15-16 under §102(e); and Claims 4-6, 12-14, 17-24 under §103(a). The Appellant filed a first Amendment on April 24, 2007, amending Claims 1-3, 5-6, 9-11, 13-14, 17-19, and 21-22. The Examiner considered the first Amendment and subsequently issued a Final Rejection on July 13, 2007, rejecting Claims 1-3, 5-6, 9-11, 13-14, 17-19, and 21-22 under §112, first paragraph; and rejected all the Claims under §103(a). The Appellants filed a Pre-Appeal Brief Request for Review with a Notice of Appeal on September 13, 2007, for Claims 1-24 as filed with the first Amendment of April 24, 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed to a time-switched preamble generator and method of generating a time-switched preamble for use with a multiple-input, multiple-output (MIMO) transmitter employing first and second transmit antennas. (*See* page 29, lines 1-4.) The present invention introduces the broad concept of accomplishing channel estimation with reduced computational complexity without increasing operating overhead. (*See* page 4, paragraph 8.)

Independent Claim 1 is directed to a time-switched preamble generator for use with a multiple-input, multiple-output (MIMO) transmitter employing first and second transmit antennas, comprising: (1) an initial preamble formatter configured to provide a first preamble to the first transmit antenna and a second preamble to the second transmit antenna during an initial time interval; and (2) a subsequent preamble formatter coupled to the initial preamble formatter and configured to provide the second preamble to the first transmit antenna and the first preamble to the second transmit antenna during a subsequent time interval, wherein at least one of the first preamble and second preambles employ a complete training sequence. (*See* pages 11-12, paragraphs 23-24.)

For example, in one illustrated embodiment is a time-switched preamble generator 115. The time-switched preamble generator 115 includes an initial preamble formatter 116 and a subsequent preamble formatter 117. In one embodiment, a training sequence (*i.e.*, an IEEE 802.11(a) long sequence) 215 is employed as the first preamble to a first transmit antenna T1, and a null 220 is employed as the second preamble to the second transmit antenna T2, wherein the preambles occur during an initial interval t1. Then, the first and second preambles are interchanged between the first and second transmit antennas T1, T2 for concurrent transmission during a subsequent time interval t2. The null 220 may be provided as a transmission employing a null sequence or a zero function as

well as an un-modulated transmission thereby allowing a more straight-forward determination of individual channel coefficients. (See pages 9-10, paragraphs 18-19; page 12, paragraph 24; and Figures 1-2.)

Independent Claim 9 is directed to a method of generating a time-switched preamble for use with a multiple-input, multiple-output (MIMO) transmitter employing first and second transmit antennas, comprising: (1) providing a first preamble to the first transmit antenna and a second preamble to the second transmit antenna during an initial time interval; and (2) further providing the second preamble to the first transmit antenna and the first preamble to the second transmit antenna during a subsequent time interval, wherein at least one of the first and second preambles employ a complete training sequence. (See page 12, paragraph 24 and pages 19-20, paragraphs 39-40.)

For example, in one embodiment, a first preamble, for a first antenna, employs a training sequence having a guard interval, and a first preamble, for a second transmit antenna, employs an initial null during an initial time interval in step 420. Then, in step 425, a second preamble, for the first transmit antenna, employs a subsequent null, and a second preamble, for the second transmit antenna, employs the training sequence and guard interval during a subsequent time interval. In this embodiment, the first set of preambles for each transmit antenna are transmitted concurrently in an initial time interval in step 420, and the second set of preambles are transmitted concurrently in a subsequent time interval in step 425. (See page 20, paragraph 40 and Figure 2 and 4.)

Independent Claim 17 is directed to a multiple-input, multiple-output (MIMO) communication system, comprising: (1) first and second transmitters employing first and second transmit antennas, respectively; (2) a time-switched preamble generator coupled to the first and second transmitters, including: (a) an initial preamble formatter that provides a first preamble to the

first transmit antenna and a second preamble to the second transmit antenna during an initial time interval; and (b) a subsequent preamble formatter coupled to the initial preamble formatter that provides the second preamble to the first transmit antenna and the first preamble to the second transmit antenna during a subsequent time interval, wherein at least one of the first and second preambles employ an undivided training sequence; and (3) first and second receivers, associated with the first and second transmitters, that employ first and second receive antennas, respectively. (See page 9, paragraph 18 and page 12, paragraph 24.)

For example, in one embodiment, a 2x2 MIMO communication system, generally designated 100, includes a transmitter 105 and a receiver 125. The transmitter includes input data 106, a transmit encoding system 110, a time-switched preamble generator 115 and a transmit system 120 having first and second transmit sections TS1, TS2 coupled to first and second transmit antennas T1, T2, respectively. The receiver 125 includes receive system 130 having first and second receive sections RS1, RS2 respectively coupled to first and second receive antennas R1, R2, and a receive decoding system 135 providing output data 126. The time-switched preamble generator 115 includes an initial preamble formatter 116 and a subsequent preamble formatter 117, which cooperate with the encoder 113, to generate a preamble so that the receiver 125 can estimate a communication channel needed to process the transmission. (See pages 9-10, paragraphs 18-19 and Figure 1.)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The first issue presented for consideration in this appeal is whether Claims 1-3, 5-6, 9-11, 13-14, 17-19, and 21-22, as rejected by the Examiner, comply with the written description requirement of 35 U.S.C. §112, first paragraph. The second issue presented for consideration in this appeal is

whether Claims 1-3, 7-11, and 15-16, as rejected by the Examiner, are patentably nonobvious in accordance with 35 U.S.C. §103(a) over U.S. Patent Application Publication No. 2004/0136464 by Suh, *et al.* (“Suh”). The third issue presented for consideration in this appeal is whether Claims 4 and 12, as rejected by the Examiner, are patently nonobvious in accordance with 35 U.S.C. §103(a) over Suh, in view of U.S. Patent Application Publication No. 2002/0057750 by Nakao, *et al.* (“Nakao”). The fourth issue presented for consideration in this appeal is whether Claims 5-6, 13-14, 17-19, and 21-24, as rejected by the Examiner, are patently nonobvious in accordance with 35 U.S.C. §103(a) over Suh, in view of U.S. Patent Application Publication No. 2004/0136464 by Li, *et al.* (“Li”). The fifth issue for consideration in this appeal is whether Claim 20, as rejected by the Examiner, is patently nonobvious in accordance with 35 U.S.C. §103(a) over Suh and Li, in view of Nakao.

VII. APPELLANT’S’ ARGUMENT

The inventions set forth in independent Claims 1, 9, and 17 and the respective dependent claims neither fail to comply with §112, first paragraph nor are obvious over the references on which the Examiner relies.

Rejection under 35 U.S.C. §112

The Examiner has rejected Claims 1-3, 5-6, 9-11, 13-14, 17-19, and 21-22 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement and, furthermore, the claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application

was filed, had possession of the claimed invention. More specifically, the Examiner asserts that, regarding Claims 1, 9, and 17, there is no mention of “wherein at least one of said first preamble and said second preamble employs a complete or an undivided training sequence.” and, further, regarding Claims 2-3, 5-6, 10-11, 18-19, and 21-22, there is no mention of “complete or undivided training sequence.” (See Final Rejection electronically delivered July 13, 2007, page 2.) The Appellants respectfully disagree.

35 U.S.C. §112, first paragraph, states that the “specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same” As noted in the MPEP, the subject matter of the claim need not be described literally (*i.e.*, using the same terms or *in haec verba*) in order for the disclosure to satisfy the description requirement. (See MPEP §2163.02.) Additionally, the MPEP states that to comply with the written description requirement of 35 U.S.C. §112, paragraph 1, each claim limitation must be expressly, implicitly, or inherently supported in the originally filed disclosure. (See MPEP §2163 (II)(A)(3)(b).)

As stated in the original specification:

In one embodiment of the present invention, a training sequence (*i.e.*, and IEEE 802.11(a) long sequence) is employed as the first preamble to the first transmit antenna T1, and a null is employed as the second preamble to the second transmit antenna T2, wherein the preambles occur during the initial time interval. Then, the first and second preambles are interchanged between the first and second transmit antennas T1, T2 for concurrent transmission during the subsequent time interval. (See paragraph 26.)

An IEEE 802.11(a) long sequence is a complete or undivided training sequence. Thus, as noted in the original specification, a training sequence that is employed for the first preamble to the first

transmit antenna in an initial time interval and to the second transmit antenna in a subsequent time interval is a complete and undivided training sequence. Therefore, at least one of the first and second preambles employs a complete and undivided training sequence.

Since the above-mentioned claims include subject matter is described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention, these claims comply with the requirements of 35 U.S.C. §112, first paragraph. Accordingly, the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claims 1-3, 5-6, 9-11, 13-14, 17-19, and 21-22 under 35 U.S.C. §112, first paragraph, and allow issuance thereof.

Rejection under 35 U.S.C. §103(a) over Suh

A. Rejection of Claims 1 and 9

The Examiner has rejected Claims 1 and 9 under 35 U.S.C. §103(a) as being unpatentable over Suh. The Appellants respectfully disagree since Suh does not teach or suggest further providing a second preamble to a first transmit antenna and a first preamble to a second transmit antenna during a subsequent time interval as recited in independent Claims 1 and 9.

The Examiner cites paragraphs 62-70 of Suh to teach wherein at least one of a first preamble and a second preamble employs a complete training sequence. (*See* Final Rejection, page 4.) Assuming *arguendo* this to be true, Suh does not teach or suggest that a first or second preamble is further provided to a first or second antenna during a subsequent time period. Suh teaches that in a two transmission antenna OFDM communication system, the preamble sequence generator generates

one of three different preamble sequences, S(-100:100), P(-100:100), and Pg(-100:100). Assuming *arguendo* long preamble sequence S(-100:100) is a complete training sequence, Suh teaches mapping sequence S(-100:100) in the long preamble sequence period to corresponding subcarriers on the IFFT processor's input terminal and then ending the procedure. (*See*, for example, paragraphs 62-70, 101-102, and 105-107, Step 717 in Figure 7, Step 817 in Figure 8.) Thus, Suh teaches a training sequence is provided to a first and second antenna concurrently and then ends the procedure. Suh does not teach or suggest a training sequence is provided to a first antenna in one time period and then to a second in a subsequent time period as recited in independent Claims 1 and 9.

As such, Suh does not teach or suggest each element of independent Claims 1 and 9 and fails to provide a *prima facie* case of obviousness of Claims 1 and 9. Accordingly, the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claims 1 and 9 and allow issuance thereof.

B. Rejection of Claims 2 and 10

The Examiner has rejected Claims 2 and 10 under 35 U.S.C. §103(a) as being unpatentable over Suh. The above argument establishing the nonobviousness of independent Claims 1 and 9 is incorporated herein by reference. Dependent Claims 2 and 10 additionally require the first preamble employs a complete training sequence and the second preamble employs a null, and thereby introduce a patently distinct limitation in addition to the limitations recited in Claims 1 and 9. Suh, however, does not teach or suggest the first preamble employs a complete training sequence and the second preamble employs a null in combination with the base claim limitations. Thus, Suh does not establish a *prima facie* case of obviousness of dependent Claims 2 and 10. Accordingly, Claims 2

and 10 are nonobvious over Suh and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claims 2 and 10 and allow issuance thereof.

C. Rejection of Claims 3 and 11

The Examiner has rejected Claims 3 and 11 under 35 U.S.C. §103(a) as being unpatentable over Suh. The above argument establishing the nonobviousness of independent Claims 1 and 9 and dependent Claims 2 and 10 are incorporated herein by reference. Dependent Claims 3 and 11 additionally require that the complete training sequence occurs during the null, and thereby introduce a patently distinct limitation in addition to the limitations recited in Claims 1-2 and 9-10. Suh, however, does not teach or suggest that the complete training sequence occurs during the null in combination with the base and intervening claim limitations. Thus, Suh does not establish a *prima facie* case of obviousness of dependent Claims 3 and 11. Accordingly, Claims 3 and 11 are nonobvious over Suh and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claims 3 and 11 and allow issuance thereof.

D. Rejection of Claims 7 and 15

The Examiner has rejected Claims 7 and 17 under 35 U.S.C. §103(a) as being unpatentable over Suh. The above argument establishing the nonobviousness of independent Claims 1 and 9 is incorporated herein by reference. Dependent Claims 7 and 17 additionally require that at least one of the first and second preambles employs a guard interval, and thereby introduce a patently distinct limitation in addition to the limitations recited in Claims 1 and 9. Suh, however, does not teach or

suggest that at least one of the first and second preambles employs a guard interval in combination with the base claim limitations. Thus, Suh does not establish a *prima facie* case of obviousness of dependent Claims 7 and 15. Accordingly, Claims 7 and 15 are nonobvious over Suh and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claims 7 and 15 and allow issuance thereof.

E. Rejection of Claims 8 and 16

The Examiner has rejected Claims 8 and 16 under 35 U.S.C. §103(a) as being unpatentable over Suh. The above argument establishing the nonobviousness of independent Claims 1 and 9 is incorporated herein by reference. Dependent Claims 8 and 16 additionally require that the initial and subsequent time intervals are contiguous, and thereby introduce a patently distinct limitation in addition to the limitations recited in Claims 1 and 9. Suh, however, does not teach or suggest that the initial and subsequent time intervals are contiguous in combination with the base claim limitations. Thus, Suh does not establish a *prima facie* case of obviousness of dependent Claims 8 and 16. Accordingly, Claims 8 and 16 are nonobvious over Suh and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claims 8 and 16 and allow issuance thereof.

Rejection under 35 U.S.C. §103(a) over Suh in view of Nakao

The Examiner has rejected Claims 4 and 12 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Suh and Nakao. The above argument establishing the nonobviousness of independent Claims 1 and 9 is incorporated herein by reference. Dependent Claims 4 and 12

additionally require that the null is selected from a group consisting of a null sequence, a zero function, and an un-modulated transmission, and thereby introduce a patently distinct limitation in addition to the limitations recited in Claims 1 and 9. The Examiner did not apply Nakao to cure the above-noted deficiencies of Suh, but to teach the additional limitations of Claims 4 and 12. The cited combination does not teach or suggest that the null is selected from a group consisting of a null sequence, a zero function, and an un-modulated transmission in combination with the base claim limitations. Thus, the cited combination of Suh and Nakao does not establish a *prima facie* case of obviousness of independent Claims 4 and 12. Accordingly, the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claims 4 and 12 and allow issuance thereof.

Rejection under 35 U.S.C. §103(a) over Suh in view of Li

A. Rejection of Claim 17

The Examiner has rejected Claim 17 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Suh and Li. The above arguments establishing the nonobviousness of independent Claims 1 and 9 are incorporated herein by reference. As discussed above, the Appellants do not find in Suh a teaching or suggestion of providing a second preamble to a first transmit antenna and a first preamble to a second transmit antenna during a subsequent time interval as also recited in independent Claim 17. The Examiner has not applied Li to cure the above-noted deficiencies of Suh but to teach first and second receivers, associated with the first and second transmitters, that employ first and second receive antennas, respectively. As such, the cited combination does not teach or suggest each element of independent Claim 17, and does not provide a

prima facie case of obviousness of Claim 17. Accordingly, Claim 17 is nonobvious over these cited references and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 17 and allow issuance thereof.

B. Rejection of Claims 5, 13, and 21

The Examiner has rejected Claims 5, 13, and 21 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Suh and Li. The above arguments establishing the nonobviousness of independent Claims 1, 9, and 17 are incorporated herein by reference. Dependent Claims 5, 13, and 21 additionally require wherein the first preamble employs a complete training sequence and the second preamble employs a complete second training sequence orthogonal to the complete first training sequence, and thereby introduce a patently distinct limitation in addition to the limitations recited in Claims 1, 9, and 17. The cited combination of Suh and Li, however, does not teach or suggest wherein the first preamble employs a complete training sequence and the second preamble employs a complete second training sequence orthogonal to the complete first training sequence in combination with the base claim limitations. Thus, the cited combination of Suh and Li does not establish a *prima facie* case of obviousness of dependent Claims 5, 13, and 21. Accordingly, Claims 5, 13, and 21 are nonobvious over Suh and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claims 5, 13, and 21 and allow issuance thereof.

C. Rejection of Claims 6, 14, and 22

The Examiner has rejected Claims 5, 13, and 21 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Suh and Li. The above arguments establishing the nonobviousness of independent Claims 1, 9, and 17 and dependent Claims 5, 13, and 21 are incorporated herein by reference. Dependent Claims 6, 14, and 22 additionally require wherein the complete first training sequence employs a subset of tones and the complete second training sequence employs a remaining subset of tones, and thereby introduce a patently distinct limitation in addition to the limitations recited in Claims 1 and 5, 9 and 13, and 17 and 21. The cited combination of Suh and Li, however, does not teach or suggest wherein the complete first training sequence employs a subset of tones and the complete second training sequence employs a remaining subset of tones in combination with the base and intervening claim limitations. Thus, the cited combination of Suh and Li does not establish a *prima facie* case of obviousness of dependent Claims 6, 14, and 22. Accordingly, Claims 6, 14, and 22 are nonobvious over Suh and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claims 6, 14, and 22 and allow issuance thereof.

D. Rejection of Claims 18-19 and 23-24

The Examiner has rejected Claims 18-19 and 23-24 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Suh and Li. The above arguments establishing the nonobviousness of independent Claim 17 and dependent Claims 2-3, 7-8, 10-11, and 15-16 are incorporated herein by reference. Dependent Claims 18-19 and 23-24 introduce patently distinct limitations that correspond to the above-noted dependent claims in addition to the limitations recited

in Claim 17. The cited combination of Suh and Li, however, does not teach or suggest these limitations in combination with the base claim limitations as noted in the incorporated arguments. Thus, the cited combination of Suh and Li does not establish a *prima facie* case of obviousness of dependent Claims 18-19 and 23-24. Accordingly, Claims 18-19 and 23-24 are nonobvious over Suh and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claims 18-19 and 23-24 and allow issuance thereof.


Rejection under 35 U.S.C. §103(a) over Suh in view of Li and Nakao

The Examiner has rejected Claim 20 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Suh, Li, and Nakao. The above arguments establishing the nonobviousness of independent Claim 17 and dependent Claim 18 are incorporated herein by reference. Dependent Claim 20 additionally requires that the null is selected from a group consisting of a null sequence, a zero function, and an un-modulated transmission, and thereby introduce a patently distinct limitation in addition to the limitations recited in Claims 17-18. The cited combination of Suh, Li, and Nakao, however, does not teach or suggest requires that the null is selected from a group consisting of a null sequence, a zero function, and an un-modulated transmission in combination with the base and intervening claim limitations. Thus, the cited combination of Suh, Li, and Nakao does not establish a *prima facie* case of obviousness of dependent Claim 20. Accordingly, Claim 20 is nonobvious over the cited combination of Suh, Li, and Nakao, and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 20 and allow issuance thereof.

For the reasons set forth above, the Claims on appeal comply with §112, first paragraph. Further, the Claims are patentably nonobvious over Suh, Suh in view of Nakao, Suh in view of Li, and Suh in view of Li and Nakao. Accordingly, the Appellant respectfully requests that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of all of the Appellant's pending claims.

Respectfully submitted,

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VIII. APPENDIX A - CLAIMS

1. A time-switched preamble generator for use with a multiple-input, multiple-output (MIMO) transmitter employing first and second transmit antennas, comprising:
 - an initial preamble formatter configured to provide a first preamble to said first transmit antenna and a second preamble to said second transmit antenna during an initial time interval;
 - a subsequent preamble formatter coupled to said initial preamble formatter and configured to provide said second preamble to said first transmit antenna and said first preamble to said second transmit antenna during a subsequent time interval; and
 - wherein at least one of said first preamble and said second preamble employs a complete training sequence.
2. The generator as recited in Claim 1 wherein said first preamble employs said complete training sequence and said second preamble employs a null.
3. The generator as recited in Claim 2 wherein said complete training sequence occurs during said null.
4. The generator as recited in Claim 2 wherein said null is selected from the group consisting of:
 - a null sequence;
 - a zero function; and
 - an un-modulated transmission.

5. The generator as recited in Claim 1 wherein said first preamble employs a complete first training sequence and said second preamble employs a complete second training sequence orthogonal to said complete first training sequence.

6. The generator as recited in Claim 5 wherein said complete first training sequence employs a subset of tones and said complete second training sequence employs a remaining subset of tones.

7. The generator as recited in Claim 1 wherein at least one of said first and second preambles employs a guard interval.

8. The generator as recited in Claim 1 wherein said initial and subsequent time intervals are contiguous.

9. A method of generating a time-switched preamble for use with a multiple-input, multiple-output (MIMO) transmitter employing first and second transmit antennas, comprising:

providing a first preamble to said first transmit antenna and a second preamble to said second transmit antenna during an initial time interval;

further providing said second preamble to said first transmit antenna and said first preamble to said second transmit antenna during a subsequent time interval; and

wherein at least one of said first preamble and said second preamble employs a complete training sequence.

10. The method as recited in Claim 9 wherein said first preamble field employs said complete training sequence and said second preamble field employs a null.

11. The method as recited in Claim 10 wherein said complete training sequence occurs during said null.

12. The method as recited in Claim 10 wherein said null is selected from the group consisting of:

a null sequence;

a zero function; and

an un-modulated transmission.

13. The method as recited in Claim 9 wherein said first preamble employs a complete first training sequence and said second preamble employs a complete second training sequence orthogonal to said complete first training sequence.

14. The method as recited in Claim 13 wherein said complete first training sequence employs a subset of tones and said complete second training sequence employs a remaining subset of tones.

15. The method as recited in Claim 9 wherein at least one of said first and second preambles employs a guard interval.

16. The method as recited in Claim 9 wherein said initial and subsequent time intervals are contiguous.

17. A multiple-input, multiple-output (MIMO) communication system, comprising:
first and second transmitters employing first and second transmit antennas, respectively;
a time-switched preamble generator coupled to said first and second transmitters,
including:

an initial preamble formatter that provides a first preamble to said first transmit antenna and a second preamble to said second transmit antenna during an initial time interval,

a subsequent preamble formatter coupled to said initial preamble formatter that provides said second preamble to said first transmit antenna and said first preamble to said second transmit antenna during a subsequent time interval; and

wherein at least one of said first preamble and second preamble employs an undivided training sequence; and

first and second receivers, associated with said first and second transmitters, that employ first and second receive antennas, respectively.

18. The system as recited in Claim 17 wherein said first preamble employs said undivided training sequence and said second preamble employs a null.

19. The system as recited in Claim 18 wherein said undivided training sequence

occurs during said null.

20. The system as recited in Claim 18 wherein said null is selected from the group consisting of:

a null sequence;

a zero function; and

an un-modulated transmission.

21. The system as recited in Claim 17 wherein said first preamble employs an undivided first training sequence and said second preamble employs an undivided second training sequence orthogonal to said undivided first training sequence.

22. The system as recited in Claim 21 wherein said undivided first training sequence employs a subset of tones and said undivided second training sequence employs a remaining subset of tones.

23. The system as recited in Claim 17 wherein at least one of said first and second preambles employs a guard interval.

24. The system as recited in Claim 17 wherein said initial and subsequent time intervals are contiguous.

IX. APPENDIX B - EVIDENCE

The evidence in this appendix includes a U.S. Patent to Suh and U.S. Patent Application Publications by Nakao and Li. Suh, Nakao, and Li were entered in the record by the Examiner with the first Examiner's Office Action.

X. RELATED PROCEEDINGS APPENDIX

NONE